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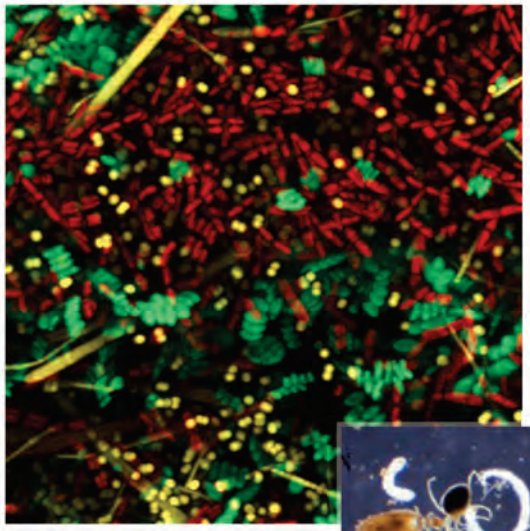
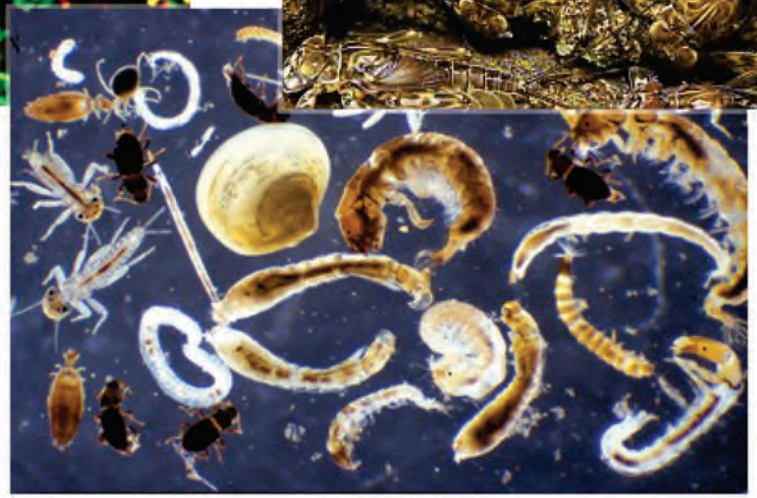
Washington State Department of Ecology: Biological Assessment Model Development and Use in State Regulatory Programs

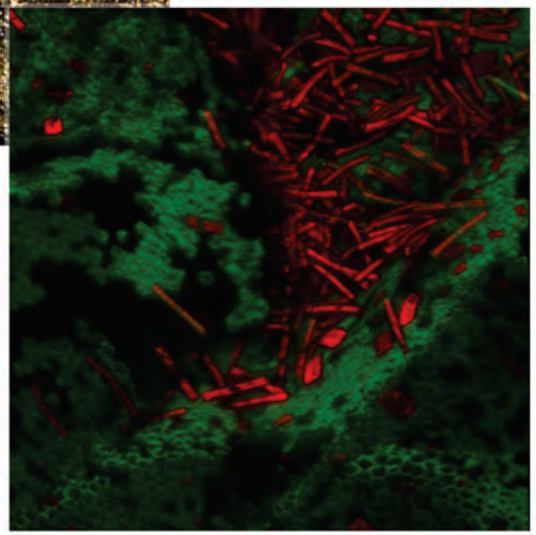
Chad Brown
Washington (State). Department of Ecology, chad.brown@ecy.wa.gov

Chad Larson
Washington (State). Department of Ecology

Biological Assessment Model Development and Use in State Regulatory Programs







DEPARTMENT OF
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Brief discussion of:

- Biological Index – how does it fit into the water quality standards regulation?
- How does Ecology use macroinvertebrate indices to designate impaired rivers and streams?
- Ecology's current biomonitoring program for freshwaters

Clean Water Act Objectives

- Restore and Maintain the **chemical**, **physical**, and **biological** integrity of our waters

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Fishable and Swimmable Goals - CWA Section 101(a)

Aquatic Life Use	Protection and propagation of fish, shellfish and wildlife
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  - Designated Uses
  - Criteria to protect those uses (Numeric and Narrative)
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Criteria development

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  - Other scientifically defensible methods

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Useful for measuring the **chemical** integrity of our waters necessary to protect designated uses

Examples

- **Direct concentration limits for pollutants** – metals, organic chemicals, temperature, nutrients, etc.
- **Surrogates that indicate other pollution problems** – dissolved oxygen, chlorophyll-a, bacteria indicators

Criteria development

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  - Used where numeric criteria cannot be established or to supplement numeric criteria
  - Must be scientifically defensible

Criteria development

- **Narrative criteria –**
  - Developed where numeric criteria cannot be established or to supplement numeric criteria
  - Must be scientifically defensible

Most useful for measuring the **Physical** and **Biological** integrity necessary to protect designated uses

Examples

- Adequate substrate for salmon spawning
- Natural flow regimes
- Aesthetics
- Aquatic species richness and abundance

Biological Indices

Fish Assemblage Index
Macroinvertebrate Index
Periphyton Index

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How do we incorporate these into our water quality standards, and cleanup programs?

We currently use our Narrative Criteria provisions to develop <u>thresholds</u> which distinguish impaired waters from waters that are meeting designated uses.

Bioassessment Indices

Fish Assemblage Index
Macroinvertebrate Index
Periphyton Index

Index thresholds are different than numeric criteria

- Index thresholds are tools to indicate impaired waterbodies

  -- but are not numeric limits in state rule

  Developing WQS rules has a very high bar – often requires site-specific or regional precision.

- Thresholds are developed in policy.
- Thresholds are used by many states- and a few have index models that are robust enough to set biological index values as criteria in water quality standards.

This is the goal -- numeric biological index criteria

How does Washington use a biological index such as B-IBI for regulatory decisions?

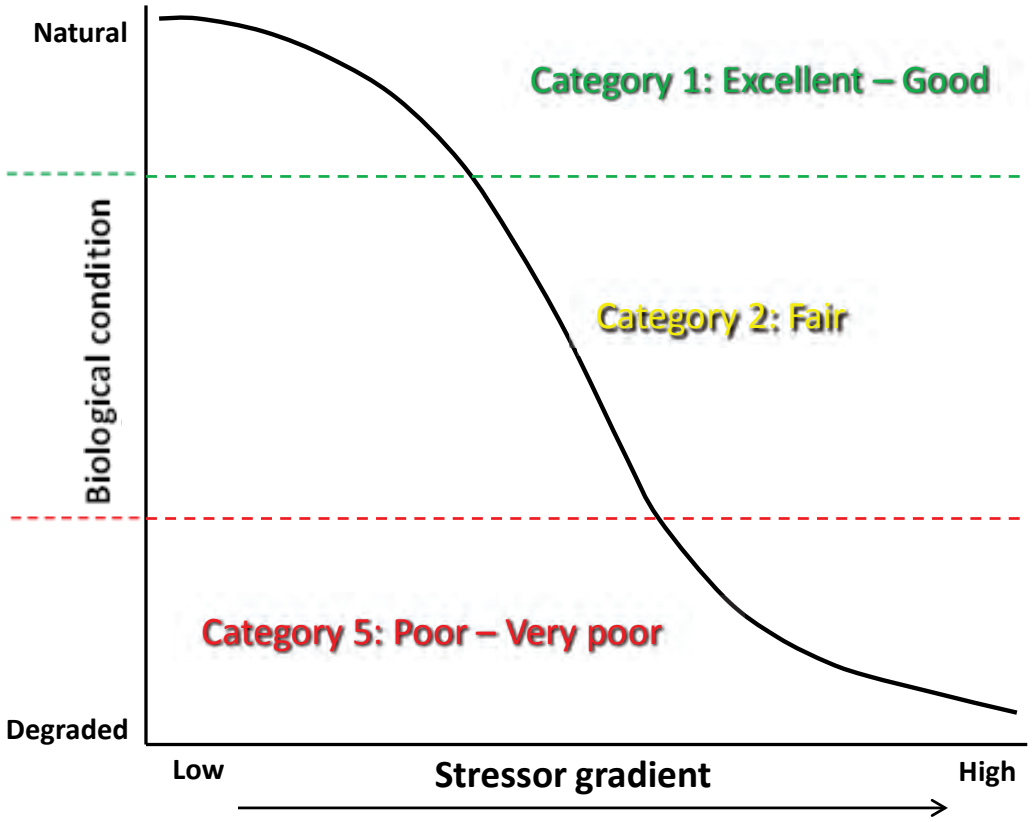
Washington's Water Quality Assessment

Category 1 – aquatic life uses are protected

Category 2 – possible impairment of aquatic life uses – prioritize for further study

Category 5 – aquatic life uses are impaired (303d list)
Water cleanup study is required.
Total Maximum daily Load (**TMDL**)

Biological condition gradient

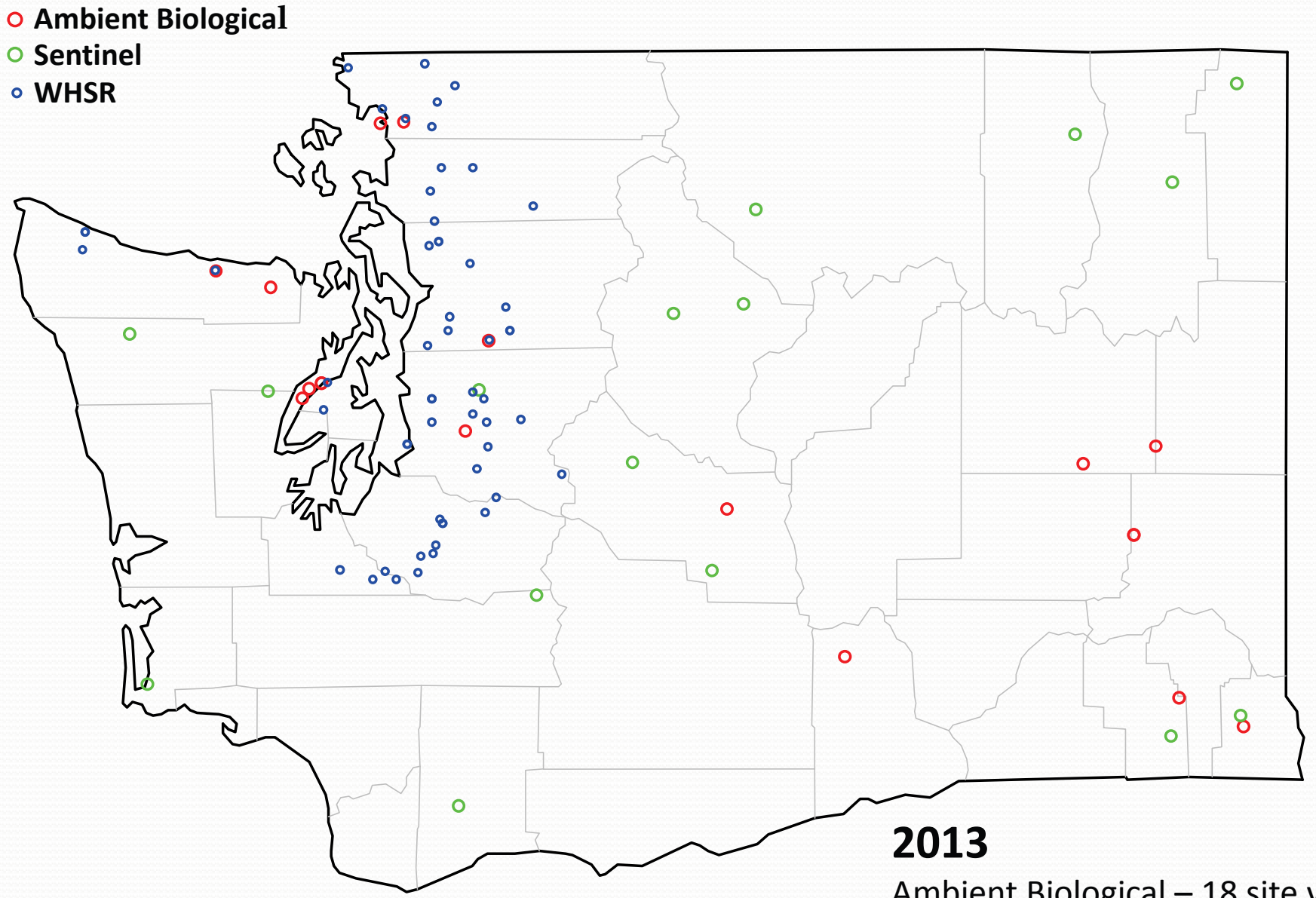


Biomonitoring Programs at Ecology

1) **Ambient Biological** – reference sites from eight Washington ecoregions – rotating (8-10 sites in each ecoregion)

1) **Sentinel** – reference sites sampled annually from 16 sites statewide

2) **Watershed Health and Salmon Recovery** – randomly selected sites sampled throughout seven Status and Trends Monitoring Regions (50 sites per region, with 25 new random sites & 25 revisits on repeat cycle)

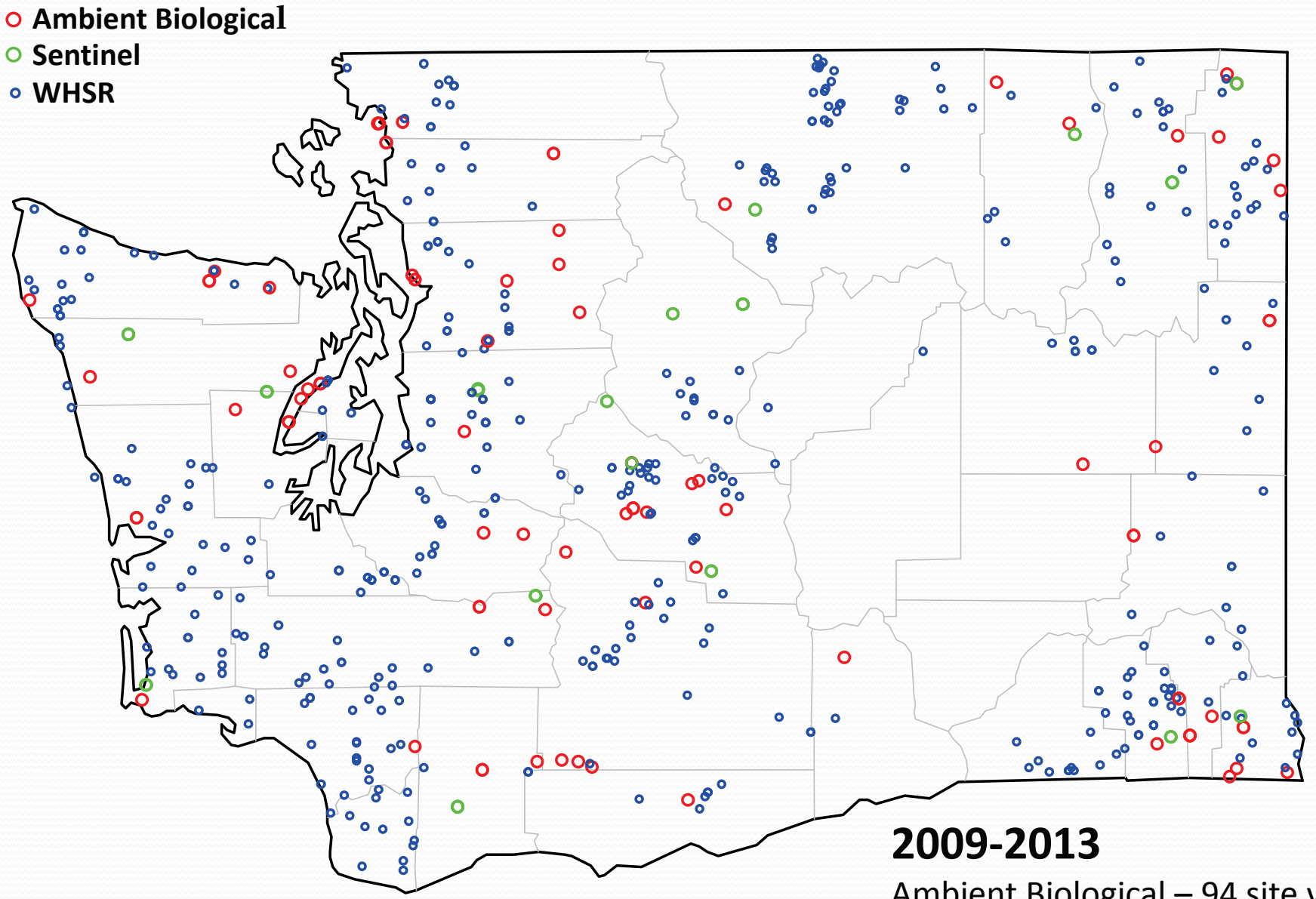


2013

Ambient Biological – 18 site visits

Sentinel – 16 site visits

WHSR – 55 site visits



2009-2013

Ambient Biological – 94 site visits

Sentinel – 54 site visits

WHSR – 443 site visits

Ecology contacts

Chad Brown
Water Quality Standards,
WQ Program
chad.brown@ecy.wa.gov
(360) 407-6128

- WQ Standards – conventional pollutants
- WQ Assessment/ 303(d) listing policy

Chad Larson
Directed Studies,
Enviromental Assessment Program
chad.larson@ecy.wa.gov
(360) 407-7456

- Status and Trends – biological monitoring
- Biological index development

Ambient Biological - Ecoregions

2014	2015
Coast Range	Cascades
Eastern Slopes	North Cascades
Northern Rockies	Blue Mountains

Starting in 2014, annual sampling of 3 sites from each Ecoregion not sampled during a particular year

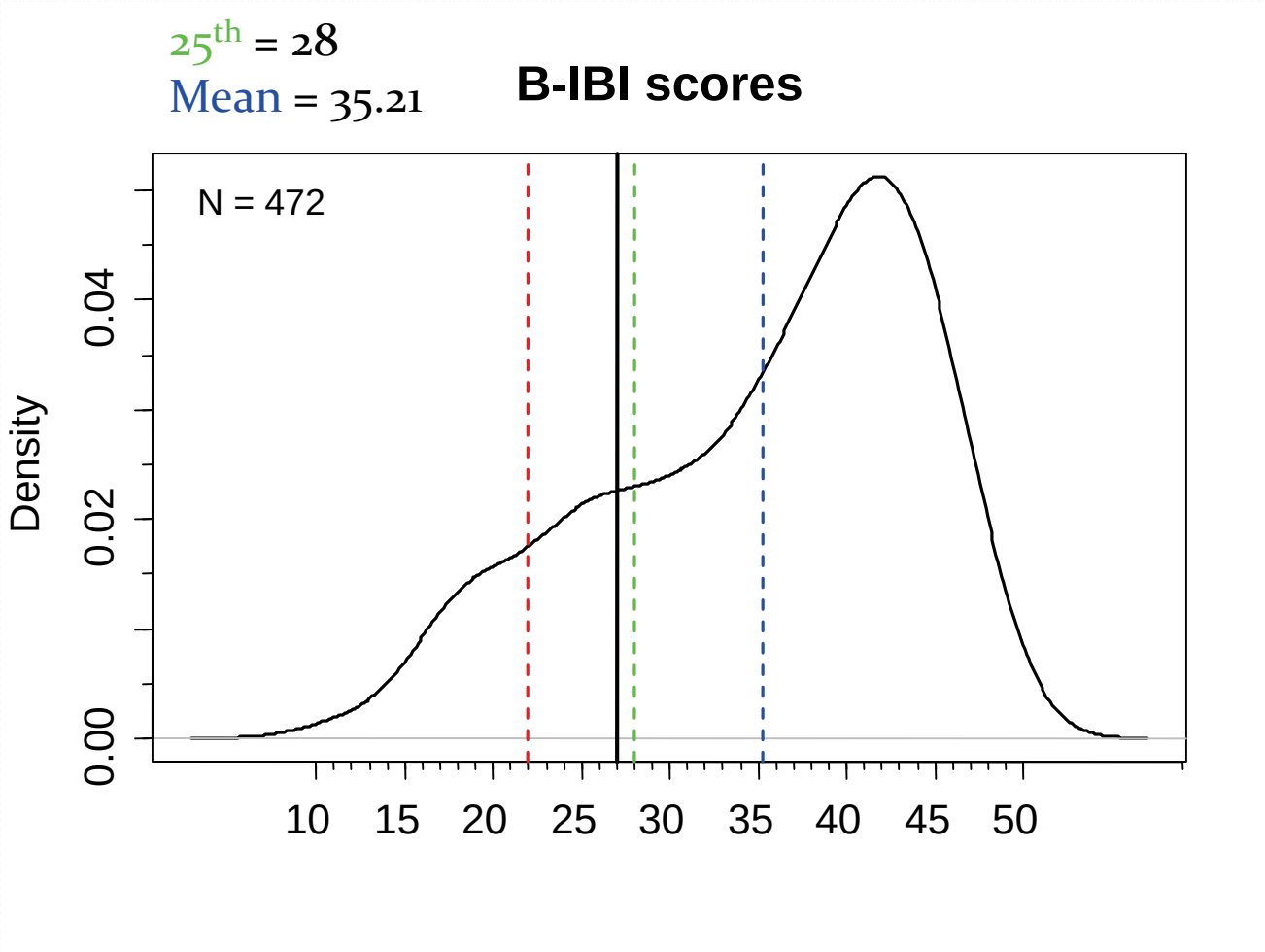
WHSR – Status and Trends Monitoring Regions

2014	2015
Coastal	Mid Columbia
Lower Columbia River	Snake River

10th = 22

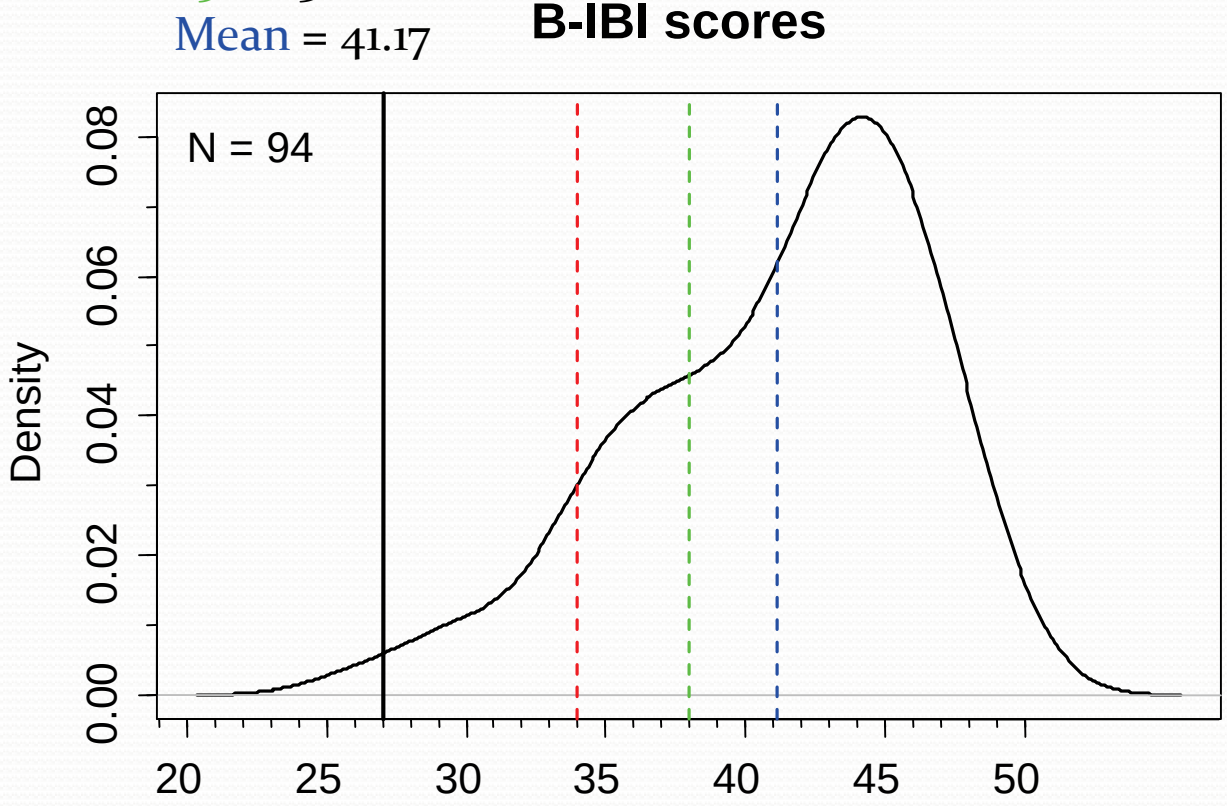
25th = 28

Mean = 35.21



Reference sites only (Ambient Biological, Sentinel)

10th = 34
25th = 38
Mean = 41.17



10th = 25.02

25th = 45.18

Mean = 62.30